

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 December 2000 (14.12.2000)

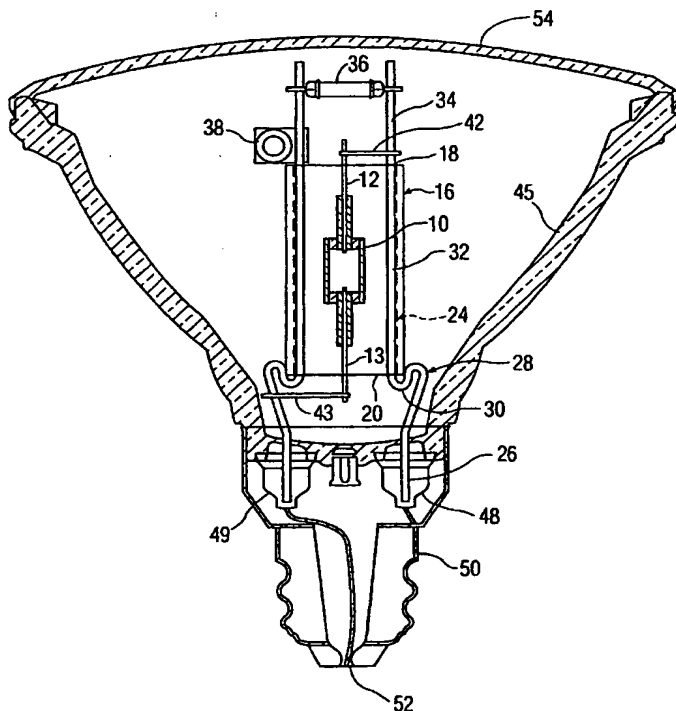
PCT

(10) International Publication Number
WO 00/75958 A1

- (51) International Patent Classification?: **H01J 61/34, 61/82**
- (21) International Application Number: **PCT/EP00/04401**
- (22) International Filing Date: **11 May 2000 (11.05.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
09/323,806 **2 June 1999 (02.06.1999)** **US**
- (71) Applicant: **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).**
- (72) Inventors: **NELSON, Gregory, J.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). VAN LIEROP, Franciscus, H.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). BAILEY, John, S.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).**
- (74) Agent: **DUSSELDORP, Jan, C.; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).**
- (81) Designated States (*national*): **CN, JP.**
- (84) Designated States (*regional*): **European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).**
- Published:
— *With international search report.*

[Continued on next page]

(54) Title: **METAL HALIDE LAMP WITH PROTECTIVE SLEEVE**



(57) Abstract: A ceramic metal halide arc tube is surrounded by a protective sleeve supported by a metal frame having current wire frame members brazed into the metal ferrules of a PAR-lamp (1). Each frame member has an integral engaging means such as an S-shaped bend which engages the lower end of the sleeve (2), and a spacer may separate the upper ends of the frame to form a rigid self-supporting structure.

WO 00/75958 A1

WO 00/75958 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Metal halide lamp with protective sleeve.

The invention relates to a lamp of the type having a protective sleeve of quartz surrounding a light source, in particular a metal halide arc tube having a pair of opposed leads. The sleeve is supported by a metal frame comprising a pair of metal frame members which also supply current to the leads.

5 Protective sleeves of quartz or other transparent material able to withstand operating temperatures are commonly utilized around metal halide arc tubes, also known as high intensity discharge or HID arc tubes, in order to provide protection against non-passive failure during lamp operation. These sleeves act to slow or stop fast moving arc tube fragments and prevent the rupture of the outer lamp envelope. These sleeves may also
10 provide other functions including, but not limited to, reduction of the UV output of the lamp.

Protective sleeves are typically mounted around the arc tube using additional straps or clips around the outside or in the ends of the sleeve. In the case of quartz metal halide arc tube, any metal supports used in the mounting must be kept away from the arc tube or be electrically floating to reduce the rate of sodium loss. An arrangement of this type,
15 having a metal frame member outside of the sleeve, is disclosed in EP 0 784 334.

A known floodlamp having a parabolic aluminized reflector (PAR) utilizes a metal halide arc tube and a protective sleeve supported by straps attached to current carrying wire frame members outside the sleeve. The frame members are brazed into metal ferrules at the base of the reflector, and therefore must have good alignment.

20 U.S. Patent No. 5,719,463 discloses a metal halide discharge lamp having a quartz metal halide arc tube with a quartz protective sleeve. A first lead wire for the arc tube passes through the inside of the sleeve and is provided with insulation to prevent sodium loss from the arc tube. This lead wire engages a dimple in the top of the ellipsoidal outer envelope to provide stability. The protective sleeve is supported by insulated stop members fitted in
25 opposed ends of the sleeve and around the first lead wire. One of the stop members is held in place by a bend in the first lead wire, while the other is held in place by a bend in the second lead wire.

U.S. application no. 09/135,863 discloses a metal halide discharge lamp having a ceramic metal halide arc tube with a quartz protective sleeve. A first lead wire

passes through the sleeve and engages a dimple in the outer envelope, but no insulation is necessary because there is no problem of sodium loss with a ceramic arc tube (such as alumina). The sleeve is held in place between a tab on the first lead wire and a terminal on the second lead wire; both lead wires are embedded in the glass stem. According to another
5 embodiment, the sleeve is held in place by bends in the lead wires, which are welded to leads embedded in the stem.

Protected mount designs are typically quite expensive and difficult to mechanize. In addition, most mounts are insufficiently rigid and may come apart with rough lamp handling (as during transportation).

10

It is an object of the invention to provide a support frame for a protective sleeve around a light source, in particular a ceramic metal halide arc tube, in a lamp having an outer envelope which does not offer any means of support such as a dimple.

15 It is a further object, to provide a support frame which can be pre-assembled to the light source and the sleeve, so that the assembly can be fixed in the lamp as a unit.

According to the invention, a pair of frame members extend through the sleeve, and each frame member is a wire which is formed to engage the lower end of the sleeve, preferably by means of an S-shaped bend.

20 According to a preferred embodiment, the sleeve is held in place axially by a tab such as a getter adjacent to the upper end of the sleeve, and the upper ends of the frame members are held apart by an insulating spacer.

Each frame member is provided with a terminal to which the opposed leads of the arc tube are brazed prior to fitting the sleeve. The tab and spacer are then fixed to form a
25 rigid self-supporting assembly wherein the lower ends of the frame members have a predetermined spacing. This permits insertion into the ferrules of a PAR-type lamp, where they are brazed in place. The lens is then fitted to the reflector without any further assembly steps being necessary.

The lamp according to the invention is therefore especially suited to
30 applications where a pre-assembled light source and sleeve is desirable from a manufacturing standpoint, and good stability is necessary without any support by the outer envelope.

While the invention is particularly suited to lamps having ceramic metal halide arc tubes, it may also find applicability with incandescent light sources such as the IR coated tungsten-halogen lamp disclosed in U.S. Patent No. 5,670,840.

The sole figure is an elevation view of a PAR lamp according to the invention.

5

The arc tube 10 has a cylindrical aluminum oxide envelope having a pair of opposed axial leads 12, 13 extending therefrom and electrodes for maintaining a discharge in the metal halide filling. The arc tube 10 is surrounded by a quartz sleeve 16 having an upper end 18 and a lower end 20. The sleeve 16 is supported by a pair of wire frame members 24 which are substantially identical but for welded-on fittings including terminals 42, 43 and getter 38. The frame members are preferably formed with stainless steel wire, but Mo, Nb, or Ni wire may also be used.

Each frame member 24 has a lower end 26, and S-shaped bend 28, a straight section 32, and an upper end 34. Each S-shaped bend incorporates an upright U-shaped bend 30 which engages the lower end 20 of the sleeve 16. A getter tab 30 positions the sleeve 16 on one of the frame members, and an insulating spacer 36 holds the upper ends 34 apart so that the straight portions 32 bear against the inside surface of sleeve 16. The spacer 36 has opposed metal eyelets which engage the frame wires, and a dielectric rod between the eyelets.

The remainder of the lamp is conventional, and includes a glass envelope 45 with an aluminized inside surface (PAR), a pair of brass ferrules 48 and 49 embedded in the glass, a brass base 50, a center contact 52, and a cover lens 54. The lower ends 26 of frame members 24 are brazed into respective ferrules 48, 49, which in turn are electrically connected to the base 50 and center contact 52.

The lamp is manufactured by holding the frame wires 24 in coplanar relationship in a jig, and welding the arc tube leads 12, 13 to respective terminals 42, 43. The sleeve 16 is then fitted over the wires 24 until the lower end 20 engages the S-shaped bends 28, the tab 38 is welded in place, and the spacer 36 is installed. This produces a rigid self-supporting structure with lower ends 26 having a predetermined spacing for insertion into the ferrules 48, 49 and brazing in place. The cover 54 is then flame sealed or glued in place, and a rugged lamp which withstands jarring is achieved.

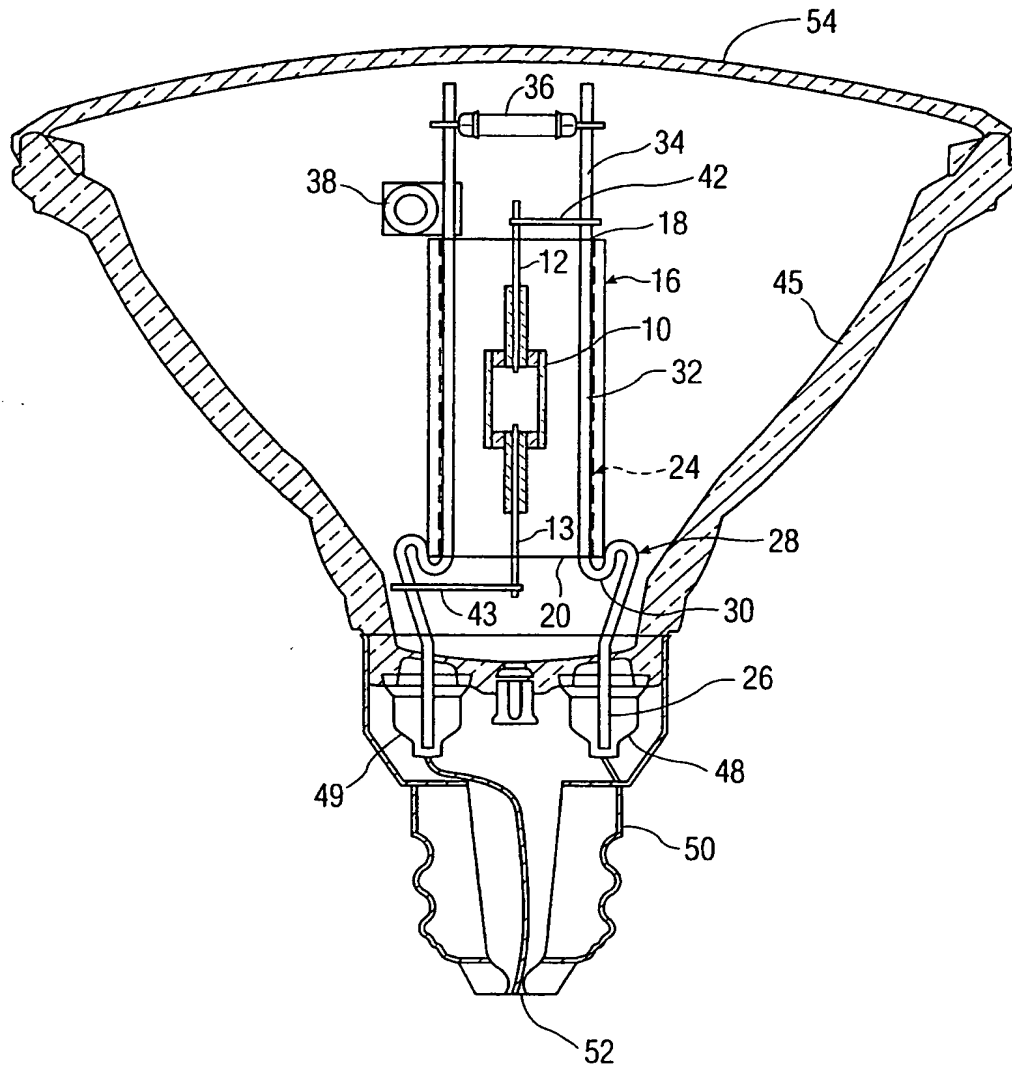
The foregoing is exemplary and not intended to limit the scope of the claims which follow.

CLAIMS:

1. A lamp comprising
a light source (10) having a pair of opposed leads (12,13),
a protective sleeve (16) around the light source (10), said sleeve having an
upper end (18) and a lower end (20), and
5 a metal frame supporting said sleeve (16), said frame comprising a pair of
frame members (24) extending through said sleeve, each said frame member (24) being
formed with integral engaging means (28) which engages said lower end (20) of said sleeve,
each said frame member (24) being connected to a respective one of said leads (12,13).
- 10 2. A lamp as in claim 1 further comprising an insulating member (36) fixed
between said frame members (24) above said upper end (20) of said sleeve (16), whereby
said light source (10), said frame members (24), said sleeve (16), and said insulating member
(36) form a rigid self-supporting structure.
- 15 3. A lamp as in claim 1 wherein said frame members (24) are wires.
4. A lamp as in claim 3 wherein said engaging means (28) comprises an S-
shaped bend formed in at least one of said wires.
- 20 5. A lamp as in claim 1 wherein said lamp further comprises a parabolic
aluminized reflector (45) having a pair of contact ferrules (48,49) in which respective frame
members are fixed.
6. A lamp as in claim 1 wherein said light source (10) has a ceramic envelope.
- 25 7. A lamp as in claim 1 further comprising a tab (38) fixed to one of said frame
members (24) above said upper end (18) of said sleeve (16), thereby holding said lower end
(20) against said engaging means (28).

8. A lamp as in claim 1 wherein said frame members are identical
9. A lamp member as in claim 1 wherein said frame members (24) are electrically connected to respective leads (12,13) of said light source (10), and provide
5 current to said light source.

1/1



INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/04401

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01J61/34 H01J61/82

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 737 913 A (THE GENERAL ELECTRIC COMPANY LIMITED) page 2, line 109 -page 3, line 49 figure	1,3,6-9
P,Y	WO 00 11704 A (KONINKL PHILIPS ELECTRONICS NV) 2 March 2000 (2000-03-02) page 2, line 20 -page 4, line 2; figures 1,2	1,3,6-9
A	EP 0 186 899 A (GTE PROD CORP) 9 July 1986 (1986-07-09) pages 4-7; figure	1,3,4,6,9
A	US 3 250 934 A (PETERSON) 10 May 1966 (1966-05-10) claims 1-4; figures 1-3	1-3,6-9
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

23 August 2000

Date of mailing of the international search report

30/08/2000

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Deroubaix, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/04401

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 540 019 A (GTE PROD CORP) 5 May 1993 (1993-05-05) column 5, line 1 -column 6, line 6; figures 2A-2B	1,3,6,9
A	US 5 594 294 A (DUFFY GERALD E ET AL) 14 January 1997 (1997-01-14) column 3, line 20 -column 5, line 3; figure 1	1,3,6,7, 9
A	EP 0 588 200 A (PATRA PATENT TREUHAND) 23 March 1994 (1994-03-23) column 3, line 21 -column 4, line 16; figure 1	1,3,6,9
A	US 5 402 033 A (VAN DER LEEUW BART ET AL) 28 March 1995 (1995-03-28) column 3, line 48 -column 4, line 50; figure 1	1,3,6,9
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 324 (E-1564), 20 June 1994 (1994-06-20) & JP 06 076799 A (HITACHI LTD), 18 March 1994 (1994-03-18) abstract	1,3,6,8, 9
A	DE 197 22 601 A (GEN ELECTRIC) 4 December 1997 (1997-12-04) cited in the application column 2, line 55 -column 6, line 49; figures 1,2	1,3,6,9

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/04401

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
GB 737913	A		FR	1057594 A	09-03-1954
WO 0011704	A	02-03-2000	NONE		
EP 0186899	A	09-07-1986	CA	1239970 A	02-08-1988
			DE	3583665 A	05-09-1991
			JP	61161647 A	22-07-1986
US 3250934	A	10-05-1966	NONE		
EP 0540019	A	05-05-1993	US	5270608 A	14-12-1993
			CA	2080418 A	01-05-1993
			DE	69221071 D	04-09-1997
			DE	69221071 T	26-02-1998
US 5594294	A	14-01-1997	NONE		
EP 0588200	A	23-03-1994	DE	4230814 A	17-03-1994
			DE	59301543 D	14-03-1996
			JP	6124690 A	06-05-1994
			US	5446336 A	29-08-1995
US 5402033	A	28-03-1995	DE	69404926 D	18-09-1997
			DE	69404926 T	12-02-1998
			EP	0645801 A	29-03-1995
			JP	7153430 A	16-06-1995
			DE	69210973 D	27-06-1996
			DE	69210973 T	28-11-1996
			EP	0549056 A	30-06-1993
			JP	5314952 A	26-11-1993
			US	5532543 A	02-07-1996
			US	5471110 A	28-11-1995
			US	5729078 A	17-03-1998
JP 06076799	A	18-03-1994	NONE		
DE 19722601	A	04-12-1997	US	5719463 A	17-02-1998

